Open and hidden heavy-flavour production as a function of multiplicity in small systems at the LHC

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Outline

Introduction

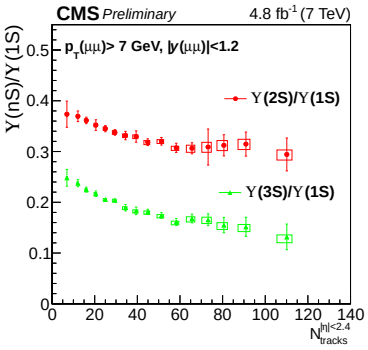
Charged-particle multiplicity dependence study:

- Particle production mechanisms, such as Multiple Parton Interactions (MPI)
- Interplay between soft and hard processes

Introduction

Charged-particle multiplicity dependence study:

- Particle production mechanisms, such as Multiple Parton Interactions (MPI)
- Interplay between soft and hard processes
- Medium-like effects: such as suppression of excited states w.r.t ground state in high multiplicity pp collisions?



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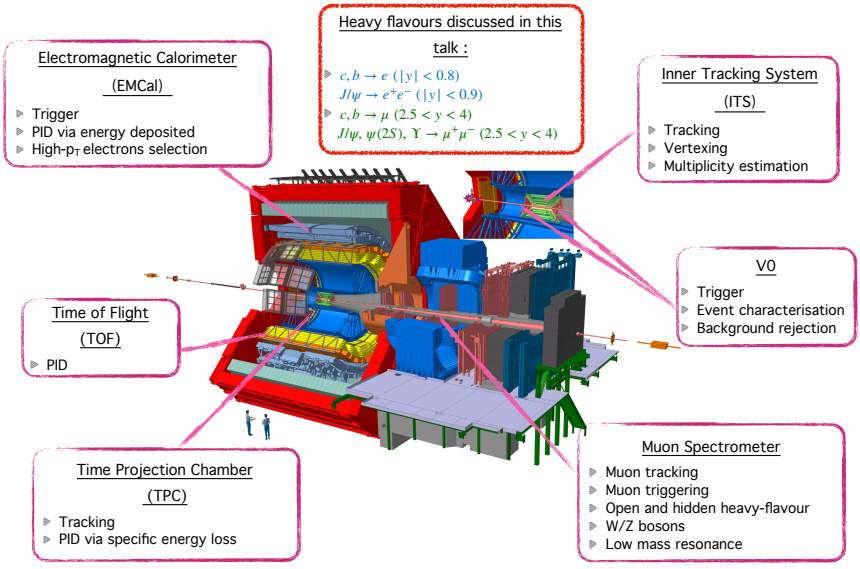
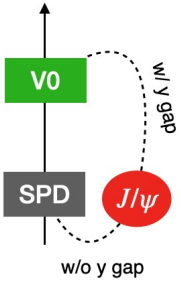
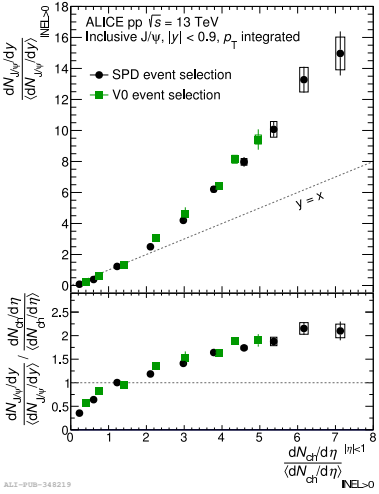
Experimental apparatus

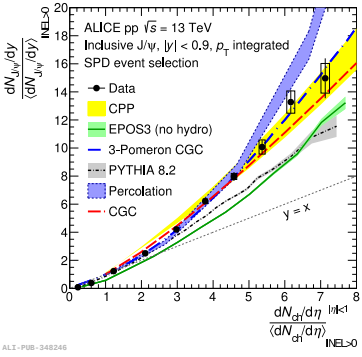


Results and discussion

J/ψ production as a function of multiplicity in pp collisions (mid-rapidity)







➔ J/ψ increases faster than linear with multiplicity

➔ The trend of data is fairly reproduced by various models

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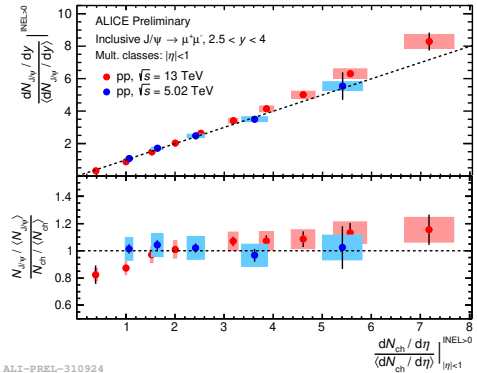
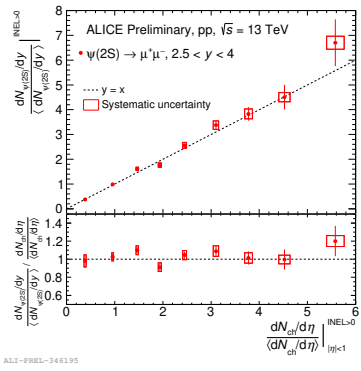
Results and discussion

Charmonium production as a function of multiplicity in pp collisions (forward rapidity)



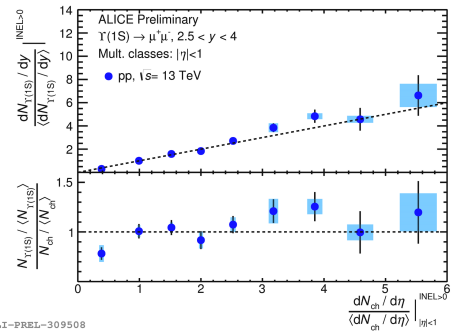


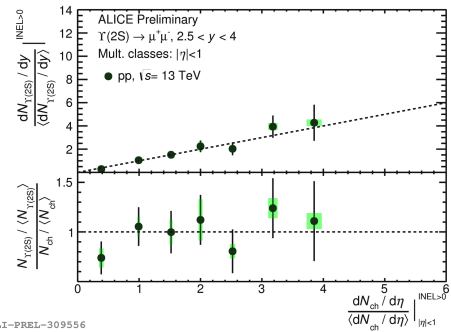
➔ Self-normalised yield: compatible with linear dependence on multiplicity (unlike mid-y)

➔ No energy dependence

Results and discussion

Υ(1S) and Υ(2S) production as a function of multiplicity in pp collisions (forward rapidity)

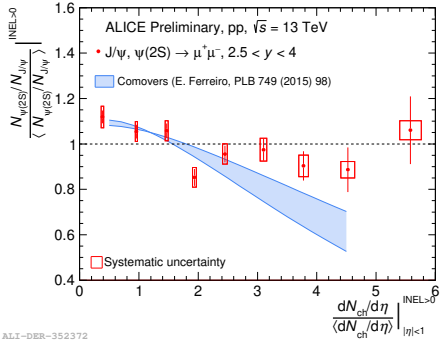


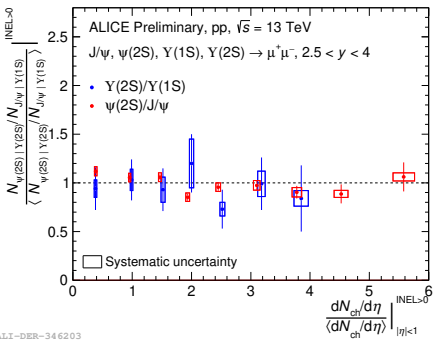


➔ Υ(1S) and Υ(2S): compatible with charmonium at forward rapidity

Results and discussion

Self-normalised yield ratio as a function of multiplicity in pp collisions

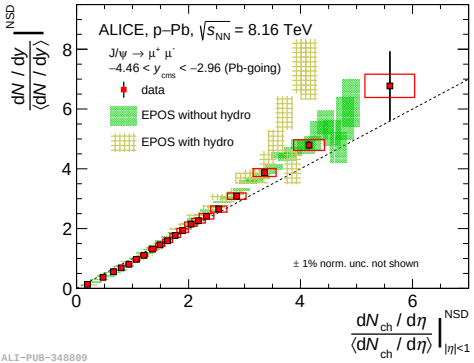


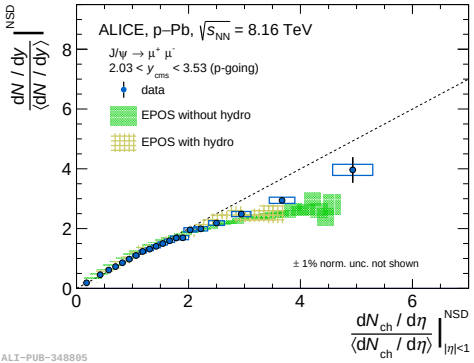


- ➔ $\psi(2S)/J/\psi$: maximum deviation from unity around 2.2σ (Hint of $\psi(2S)$ suppression w.r.t J/ψ at high multiplicity?)
- ➔ The suppression is stronger in comover approach than in data at high multiplicity
- ➔ $\Upsilon(2S)/\Upsilon(1S)$: compatible with charmonium within uncertainties

Results and discussion

J/ψ production as a function of multiplicity in p-Pb collisions





- ➔ Slightly faster-than-linear increase at backward rapidity (Pb–going)
- ➔ Slower-than-linear increase at forward rapidity (p–going)
- ➔ Data favours the model prediction without considering hydro at both rapidity intervals

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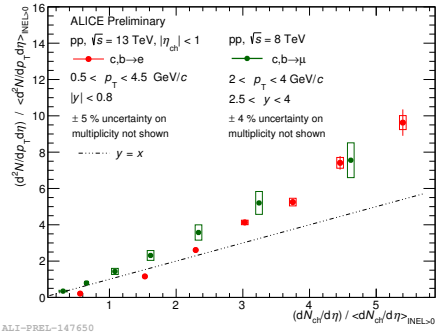
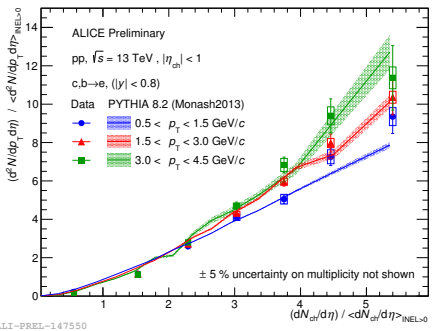
Results and discussion

HFe and HFμ production as a function of multiplicity in pp collisions





➔ Faster than linear increase of open heavy-flavour hadron decay leptons

➔ A steeper increase at high p_T

➔ PYTHIA 8.2 including MPI effects well reproduces data in all p_T intervals

Conclusion

Hidden heavy flavours

pp collisions:

- Rapidity dependence (auto-correlations?)
- No energy dependence
- Results are consistent between charmonium and bottomonium at forward rapidity

p–Pb collisions:

- Rapidity dependence (initial state effects?)

Open heavy flavours

Results show a faster than linear enhancement with charged-particle multiplicity in pp collisions

Thank you!